



Newly Defined Sphenoid Variation That Can Cause Surgical Insufficiency: Sphenoseptal Cell (Sphenoseptal Cell)

Cerrahi Eksikliğe Neden Olan Yeni Tanımlanmış Sfenoid Varyasyon: Sfenoseptal Hücre (Sfenoseptal Hücre)

Sfenoseptal Hücre / Sphenoseptal Cell

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Özet

Amaç: Bu çalışmada; nazal septumun arka tarafından başlayan ve sfenoid sinüsün içine uzanan, sağ ve sol sfenoid sinüs ile ilişkisi olmayan, anterior ve posterior etmoid hücrelerden bağımsız, daha önce tanımlanmamış Sfenoseptal Hücrenin (SSH) morfolojik ve radyolojik özellikleri anlatılmıştır. Bu hücre; anterior ve posterior etmoid hücrelerden bağımsızdır ve sağ ve sol sfenoid sinüsle ilişkisi yoktur. **Gereç ve Yöntem:** 1998-2007 yılları arasında kliniğimize başvuran ve endoskopik sinüs cerrahisi yapılan 1193 hastanın paranasal sinüs BT kesitleri 'Sfenoseptal Hücre' açısından değerlendirildi. **Bulgular:** Yapılan değerlendirme sonucunda 1193 hastanın 21'inde (%1) SSH saptandı. **Sonuç:** Paranasal sinüs incelemelerinde SSH 1% izlenmektedir. Ancak nadir de olsa sfenoid sinüs cerrahisi öncesinde mutlaka değerlendirilmelidir. Eğer dikkat edilmezse; sağ ve sol sfenoid sinüs ön duvarları açılrsa bile SSH açılmamış olur ki; bu durum cerrahi yetersizliğe ve sonuçta revizyon cerrahisine sebep olacaktır.

Anahtar Kelimeler

Sfenoid Sinüs; Paranasal BT; Sfenoseptal Hücre

Abstract

Aim: In this study, the morphological and radiological characteristics of a sphenoseptal cell (SSC) which originates from the posterior nasal septum and runs into the sphenoid sinus superiorly has been described. This cell has no relationship with the right or left sphenoid sinuses and it is independent from the anterior or posterior ethmoid cells. **Material and Method:** The paranasal sinus CT sections of 1193 patients who underwent endoscopic sinus surgery between 1998 and 2007 were evaluated for 'sphenoseptal cells'. **Results:** Based on the evaluations, SSCs were determined in 21 (1%) of 1193 patients. **Discussion:** The SSC was determined at a rate of 1% based on the paranasal sinus evaluations. Despite rare prevalence of SSC, this cell should be well evaluated before any sphenoid sinus surgery. If a SSC is overlooked, it will not be exposed even when the anterior walls of the right and left sinuses are opened. This will lead to surgical insufficiency and the need for a revision surgery.

Keywords

Sphenoid Sinus; Paranasal CT; Sphenoseptal Cell

Introduction

The sphenoid sinus is a highly overlooked structure because of its isolated location and inaccessibility [1]. It is located deep in the nasal cavity; thus, access to the sphenoid sinus by physical examination is impossible, and it cannot be visualized even by routine radiological studies [1,2]. With wide range use of such conventional methods as CT and MRI, the anatomy of the sphenoid sinus has gained in importance because of its close proximity to highly important structures.

In this study, we evaluated the morphological and radiological characteristics of a sphenoseptal cell (SSC) which originates from the posterior nasal septum and runs into the sphenoid sinus superiorly. It has no relationship with the right or left sphenoid sinuses, and it is independent from the anterior or posterior ethmoid cells. This cell has never been defined to date.

Material and Method

The paranasal sinus CT sections of 1193 patients who underwent endoscopic sinus surgery between 1998 and 2007 were evaluated for 'sphenoseptal cells'. Of the 1193 patients, 562 were female and 631 male. The mean age of the patients was 29.3 years (age range: 22-68). Consecutive sections of 2.5 mm were obtained, and based on 120 mAs and 120 kV examination protocol, the sections were evaluated on the coronal plane with Hitachi W 1000 CT. All the graphs were evaluated at bone and soft tissue density.

On the paranasal sinus tomography, any cell that originated from the posterior nasal septum and ran into the sphenoid sinus, had no relationship with the right or left sphenoid sinuses, and was independent from the anterior or posterior ethmoid cells was considered a sphenoseptal cell (SSC) [Fig1]. Any ac-

companying sphenoid sinus pathologies and anatomical variations were recorded for each of the patients with SSCs.

Results

Based on the evaluations, SSCs were determined in 21 (1%) of 1193 patients. Of these patients, 10 (45%) were female and 11 (55%) were male. The mean age of these patients was 38 years (age range: 14-80 years). Two patients had coexisting SSCs and Onodi cells, and 3 patients had optical nerve dehiscence [Fig 2]. In 6 patients, mucosal thickening of the sphenoid sinus was determined [Fig 3,4].

Discussion

The sphenoid sinus is the only paranasal sinus located on the midline. It replaces the anterior and middle cranial fossa and is adjacent to important structures such as the internal carotid artery, and the cavernous sinus encompassing the 3rd, 4th, 5th, and 6th cranial nerves. In addition, the anatomy of this region is highly variable because of potential anatomic variations such as vidian nerve protrusion, Onodi cells, and bone defects over the carotid artery. The proximity of the sphenoid sinus to the cranial nerves and the carotid artery in particular may lead to fatal complications during sinus surgery [3].

Hence, potential anatomical variations and the anatomy of the sphenoid sinus should be well defined before such operations based on evaluations with paranasal CT images obtained on the coronal plane [4,5].

The sphenoid sinus is divided into the septa by the intersinus septum. The intersinus septum may be located on the midline (38%) or on the right (20.6%) or the left (21.7%) of the midline. Besides, the accessory septa and the sphenoid sinus may

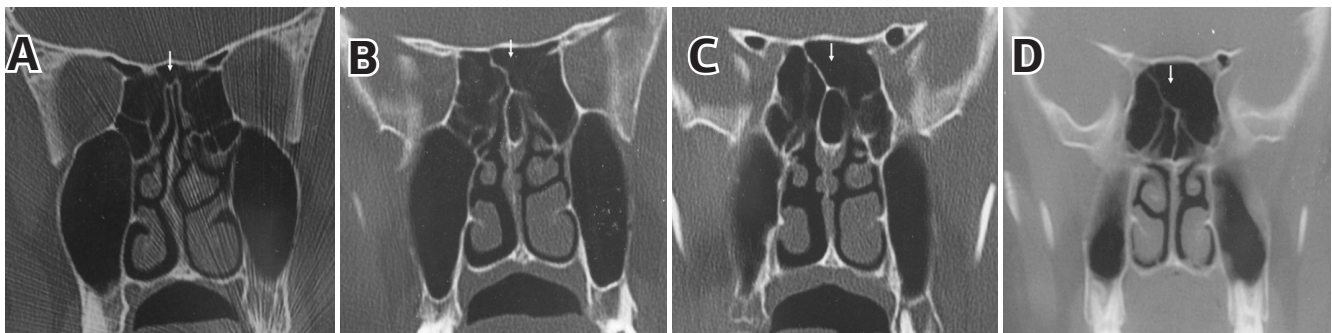


Figure 1. Consecutive sections of SSC are seen (white arrow). This cell begins from posterosuperior part of bony septum (A), and runs into the sphenoid sinus superiorly (B, C, D). This cell has no openings into the sphenoid sinuses and posterior ethmoid cells.

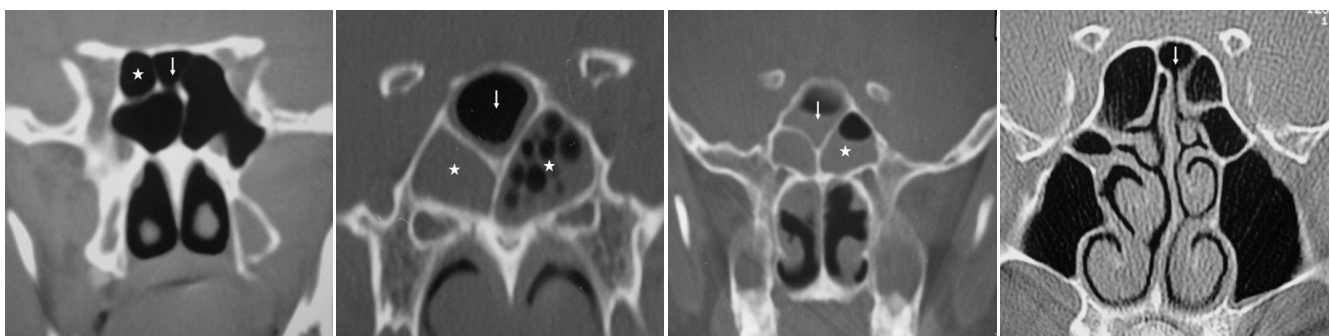


Figure 2. Onodi cell (white asteriks) and SSC (white arrow) are seen in same case. Onodi cell is located superolateral to the sphenoid sinus.

Figure 3. Radiological findings of different sinus infections are seen. Right sphenoid sinus is totally obstructed and air bubbles with pus are seen in the left one (white asterisks). It is clearly seen that SSC has only mucosal thickening (white arrow) which indicates aeration of SSC is from a different ostia than sphenoid sinus.

Figure 4. Two different cells, sphenoid cell (white asteriks) and SSC (white arrow) are seen. They have separate air-fluid levels.

Figure 5. Aeration site of SSC in sphenoid ethmoid level is seen (white arrow).

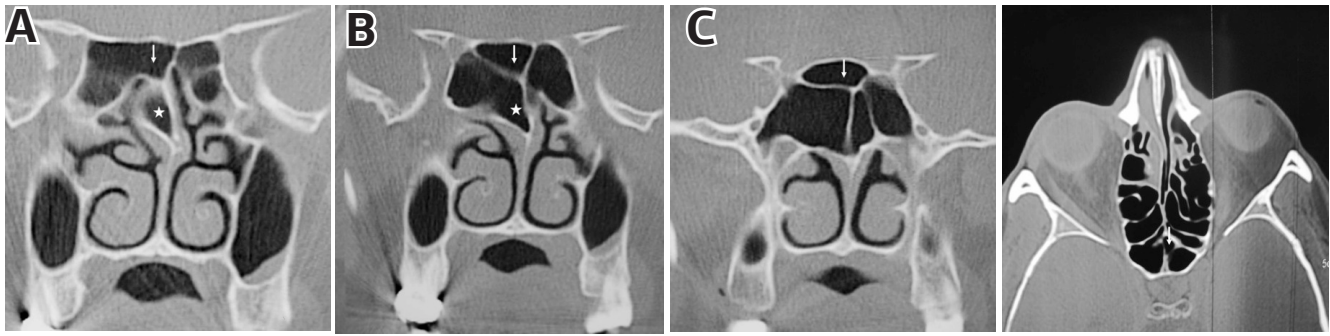


Figure 6. Consecutive sections of SSC and sphenovomerine bulla are shown (A, B, C). Sphenovomerine bulla is an extension of sphenoid sinus into vomer (white asterisks). However SSC is a unique cell which is located medially and superiorly (white arrow).

Figure 7. Medially located SSC which is not related with posterior ethmoid cells is seen (white arrow).

be further subdivided, thus composing the multisepta sphenoid sinuses.

Defined for the first time by this study, the SSC originated from the posterior nasal septum and ran into the sphenoid sinus. This cell has no relationship with the anterior or posterior ethmoid cells; in other words, it is not possible to gain access to this cell by tracing the anterior or posterior ethmoid cells during endoscopic surgery. In a case of our series, this cell has been shown to be aerated from sphenothmoid recess [Fig5]. However, further studies are needed on this subject.

In some cases, pneumatization of the sphenoid sinus may extend anteriorly into the vomer (sphenovomerine bulla) and rarely into the ethmoid bone [5]. Sphenovomerine bulla is an extension of the sphenoid sinus to the vomer. However, sphenoseptal cell begins from posterosuperior part of the nasal septum and extends posteriorly over the sphenoid sinuses [Fig 6,7].

This newly defined cell is non-related to the sphenoid sinus septa and it locates on superior side of the sphenoid sinus as a third cell. Its presence should definitely be evaluated before any surgery to the area because of its location. If it is unnoticed during surgery, it will lead to confusions, which may result in undesired outcome particularly in surgeries of the hypophysis gland. Considering the important neighboring structures of the sphenoid sinus, tomography of the area should be well evaluated preoperatively for any presence of SSCs, and the operation should be planned accordingly. It should be kept in mind that by tracing the ethmoid cells, the anterior walls of the right and left sphenoid sinuses can be opened but even then, a SSC cannot be reached. This might lead to surgical insufficiency and confusions.

A SSC should not be mistaken for an Onodi cell. An Onodi cell is the most posterior ethmoid cell, in which the optical canal projection is endoscopically recognized [4]. The apex of this cell, which has a pyramidal shape, is in the posterior and lateral direction. On evaluation of paranasal sinus CT, the Onodi cell is seen as the posterior ethmoid cell extending behind the sphenoid sinus. However, the SSC is not related to the anterior and/or posterior ethmoid cell. SSC cannot be reached by following posterior ethmoid cells. SSC originated from posterior nasal septum and ran into the sphenoid sinus. This study, 2 patients had coexisting SSC and Onodi cells, and the Onodi cell was located on the lateral of the SSC [Figure 2].

Further studies are needed to determine whether a SSC may be responsible for chronic inflammatory diseases of the sphenoid sinus. In our study, in 6 of the 21 patients with SSCs, mucosal thickening of the sphenoid sinus was determined. The clinical importance of a SSC should be further demonstrated in future studies.

Conclusion

SSC was determined at a rate of 1% based on the paranasal sinus evaluations. However, even if rare potential of SSC presence, this cell should be well evaluated before any sphenoid sinus surgery. If a SSC is overlooked, it will not be exposed even when the anterior walls of the right and left sinuses are opened. This will lead to surgical insufficiency and the need for a revision surgery.

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